

Material Safety Data Sheet

1 Identification of substance:

- **Product Grade: High Conductivity MWCNT Blend Buckypaper**
- **Product details:** Carbon nanomembrane comprising multi-walled carbon nanotubes. Avg. thickness 15-250 micron.
- **Trade name:** Carbon nanomembrane, nanopaper, buckypaper
- **Manufacturer/Supplier:**
Buckeye Composites
2000 Composite Dr.
Kettering, OH 45420
www.buckeyecomposites.com
937-297-9518

2 Composition/Data on components:

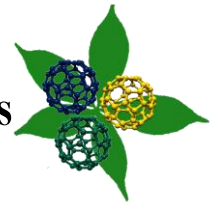
- **Chemical characterization:**
Description: (CAS#)
Graphite (CAS# 7782 - 42-5), 95%

3 Hazards identification

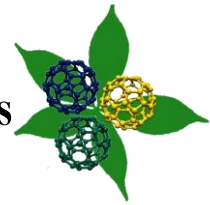
- **Hazard description:** Xi Irritant
- **Information pertaining to particular dangers for man and environment**
R 36/37 40 Irritating to eyes and respiratory system, Limited evidence of a carcinogenic effect.
- **Eye:** May cause irritation.
- **Skin:** Not fully known about skin absorption or penetration of carbon nanoparticles: Occupational risks have not been determined. Wear gloves when handling.
- **Inhalation:** Undetermined, Nanopapers have a chance of releasing nanoparticles when cut, torn, or shaken. N100 Respirators may be prudent if further processing degrades the durability of the paper or in areas with strong air currents which could cause any loose particles to become airborne.
- **Ingestion:** No known problems; however, not to be consumed.

4 First aid measures

- **After inhalation**
Supply fresh air. If required, provide artificial respiration. Keep patient warm.
Seek immediate medical advice.
- **After skin contact**
Immediately wash with water and soap and rinse thoroughly.
Seek immediate medical advice.
- **After eye contact**
Rinse opened eye for several minutes under running water. Then consult



<p>a doctor.</p> <ul style="list-style-type: none"> ● After swallowing Seek immediate medical advice.
<p>5 <u>Fire fighting measures</u></p> <ul style="list-style-type: none"> ● Suitable extinguishing agents CO₂, extinguishing powder or water spray. Fight larger fires with water spray. ● Special hazards caused by the material, its products of combustion or resulting gases: In case of fire, the following can be released: Carbon monoxide (CO), Carbon dioxide (CO₂), water vapor emissions. Dense smoke possible. ● Protective equipment: Wear self-contained respirator. Wear fully protective impervious suit.
<p>6 <u>Accidental release measures</u></p> <ul style="list-style-type: none"> ● Person-related safety precautions: Wear protective equipment. Keep unprotected persons away. Ensure adequate ventilation. ● Measures for environmental protection: Do not allow material to be released to the environment without proper governmental permits. ● Measures for cleaning/collecting: Ensure adequate ventilation. ● Additional information: See Section 7 for information on safe handling See Section 8 for information on personal protection equipment. See Section 13 for disposal information.
<p>7 <u>Handling and storage</u></p> <ul style="list-style-type: none"> ● Handling ● Information for safe handling: Keep container tightly sealed. Store in cool, dry place in tightly closed containers. Ensure good ventilation at the workplace. ● Information about protection against explosions and fires: No special measures required. ● Storage ● Requirements to be met by storerooms and receptacles: No special requirements. ● Information about storage in one common storage facility: Store away from oxidizing agents. Store away from halogens. Do not store together with acids. ● Further information about storage conditions: Keep container tightly sealed. Store in cool, dry conditions in well sealed containers.
<p>8 <u>Exposure controls and personal protection</u></p>



- **Additional information about design of technical systems:**
Properly operating chemical fume hood designed for hazardous chemicals

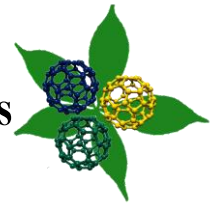
Components with limit values that require monitoring at the workplace:

Graphite	
	mg/m3
ACGIH TLV	2
Belgium TWA	2.5
Finland TWA	5
France VME	2
Germany MAK	6
Ireland TWA	5
Korea TLV	2
Netherlands MAC-TGG	2
Poland TWA	2
Sweden NGV	5 (dust)
Switzerland MAK-W	2.5
United Kingdom	5-LTEL
USA PEL	15 mppcf

- **Additional information:** No data
- **Personal protective equipment**
- **General protective and hygienic measures**
The usual precautionary measures for handling chemicals should be followed.
Keep away from foodstuffs, beverages and feed.
Remove all soiled and contaminated clothing immediately.
Wash hands before breaks and at the end of work.
Avoid contact with the eyes.
Avoid contact with the eyes and skin.
- **Breathing equipment:**
Use suitable respirator when high concentrations are present.
- **Protection of hands:** Impervious gloves.
- **Eye protection:** Safety glasses.
- **Body protection:** Protective work clothing.

9 Physical and chemical properties:

- **General Information**
 - **Form:** Membrane
 - **Color:** Black
 - **Odor:** Odorless
- | | <u>Value/Range</u> | <u>Unit</u> | <u>Method</u> |
|---|--------------------|-------------|---------------|
| ● Change in condition | | | |
| ● Melting point/Melting range: | Not determined | | |
| ● Boiling point/Boiling range: | Not determined | | |
| ● Sublimation temperature / start: | Not determined | | |



- **Flash point:** Not applicable
- **Ignition temperature:** Not determined
- **Decomposition temperature:** ~565°C.
- **Danger of explosion:**
Product does not present an explosion hazard.
- **Explosion limits:**
- **Lower:** Not determined
- **Upper:** Not determined
- **Vapor pressure:** Not determined
- **Density:** at 20 ° C ~ 0.3-0.4 g/cm³
- **Solubility in / Miscibility with**
- **Water:** Insoluble

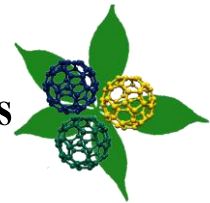
10 Stability and reactivity

- **Thermal decomposition / conditions to be avoided:**
Decomposition will not occur if used and stored according to specifications.
- **Materials to be avoided:**
Oxidizing agents
Acids
Halogens
Interhalogens
Alkali metals
- **Dangerous reactions** No dangerous reactions known
- **Dangerous products of decomposition:** Carbon monoxide and carbon dioxide

11 Toxicological information

- **Acute toxicity:**
- **Primary irritant effect:**
- **on the skin:** Irritant to skin and mucous membranes.
- **on the eye:** Irritating effect.
- **Sensitization:** No sensitizing effects known.
- **Subacute to chronic toxicity:**
The inhalation of graphite, both natural and synthetic, has caused pneumoconiosis in exposed workers. The pneumoconiosis found is similar to coal worker's pneumoconiosis.
- **Additional toxicological information:**
To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.
No classification data on carcinogenic properties of this material is available from the EPA, IARC, NTP, OSHA or ACGIH.

12 Ecological information:



- **General notes:**
Do not allow material to be released to the environment without proper governmental permits.

13 Disposal considerations

- **Product:**
- **Recommendation**
Consult state, local or national regulations to ensure proper disposal.
- **Uncleaned packagings:**
- **Recommendation:**
Disposal must be made according to official regulations.

14 Transport information

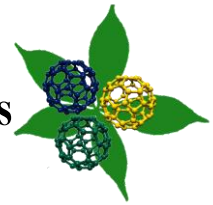
Not a hazardous material for transportation.

- **DOT regulations:**
- **Hazard class:** None
- **Land transport ADR/RID (cross-border)**
- **ADR/RID class:** None
- **Maritime transport IMDG:**
- **IMDG Class:** None
- **Air transport ICAO-TI and IATA-DGR:**
- **ICAO/IATA Class:** None
- **Transport/Additional information:**
Not dangerous according to the above specifications.

15 Regulations

- **Product related hazard informations:**
- **Hazard symbols:** Xi Irritant
- **Risk phrases:** 36/37/40 Irritating to eyes and respiratory system, Limited evidence of a carcinogenic effect
- **Safety phrases:**
S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S22 Do not breathe dust.
S28 After contact with skin, wash immediately with plenty of soap-suds.
S38 In case of insufficient ventilation, wear suitable respiratory equipment.
- **National regulations**
All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical Substance Inventory.
- **Information about limitation of use:**
For use only by technically qualified individuals.

16 Other information:



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